

Whether the exotic earthworm *Eudrilus eugeniae* (Kinberg, 1867) is displacing native species in Kerala

S. Prasanth Narayanan^{1*}, S. Sathrumithra¹, G. Christopher¹, J.M. Julka² and A.P. Thomas¹

¹ Advanced Centre of Environmental Studies and Sustainable Studies (ACCESSD), School of Environmental Sciences, Mahatma Gandhi University, Priyadarsini Hills. Kottayam - 686560, Kerala.* Email narayananke@gmail.com

² Faculty of Basic Sciences, Shoolini University, Solan, Himachal Pradesh, India.

The effects and implications of invasive species in below ground terrestrial ecosystems are not well known compared to above ground terrestrial and marine ecosystems (Gonzalez *et al.*, 2006). In this note, we are reporting on the collection of exotic earthworm *Eudrilus eugeniae* (Kinberg, 1867) from Kerala. *E. eugeniae* is an earthworm indigenous to Africa (Dominguez *et al.*, 2001). More precisely it is found in tropical West Africa, from Ghana to Nigeria to West Cameroon and Gabon (Gates, 1972; Oboh *et al.*, 2007). But its range has been extended throughout the tropics, presumably as a result of transportation by man since 1500 CE (Gates, 1972). At present this species is being cultured in farms worldwide for various purposes such as fish bait market and for making compost from organic waste (Dominguez *et al.*, 2001). Julka (2008) stated that this species is not found in natural habitats within the Indian limits. Stephenson (1923) in his book '*Fauna of British India - Oligochaeta*' mentioned that Fedarb's *E. eugeniae* specimen might have come from Travancore, Poona (Pune) or north Konkan. Aiyer (1929) did an extensive study on the oligochaetes of the erstwhile Princely State of Travancore, but he failed to collect any individual of *E. eugeniae* from Travancore. Hence, Stephenson's (1923) report becomes the sole record for the presence of this species from India in the 20th century. But recently it has been collected from the Chennai region (Begum and Ismail, 2004), shaded grassland and muddy areas of Chandigarh (Dhiman and Battish, 2006) and from the gully systems of Sir Aurobindo Ashram, Puducherry (Pondicherry) (Julka, 2008).

Since 2010, as part of our ongoing study on the earthworm diversity of Kerala, we collected samples from around 160 localities and obtained *E. eugeniae* specimens from four sites. They were identified using the key prepared by Julka (2008) and later confirmed by J.M. Julka. *E. eugeniae* specimens examined were deposited in the earthworm laboratory of the Advanced Centre of Environmental Studies and Sustainable Development, Mahatma Gandhi University, Kottayam. Among the four locations two were in Idukki district and one each in Thiruvananthapuram and Pathanamthitta districts.

Diagnosis: relatively smaller sized earthworm; darkly pigmented, restricted to dorsum; setae lumbricine, closely paired; clitellum faintly indicated in segments xiii, xiv-xviii; genital markings, typhlosole and caeca none; gizzard in v; intestine origin close to 14/15; dorsal blood vessels aborted in front of hearts of vii; hearts, of vii lateral, of viii-xi latero-esophageal; testis sacs, unpaired, ventral; prostates long, ducts short and slender but muscular; copulatory chamber large, containing penis, apertures in transverse slits, slightly in front of inter-segmental furrows 17/18.

Materials examined: 0-0-7, Parackal Estate – Rajappara, Idukki district, Habitat: Garden land within a cardamom plantation, 12 January 2011, Collectors: S.P. Narayanan, G. Christopher, K. Sreedharan, and T.K. Subash, Reg. No. ACESSD/EW/10&46; 0-0-1, Kochupamba, Pathanamthitta district, 25 January 2011, Habitat: From the root mass of grass on the edge of the reservoir, Date: 25 January 2011, Collectors: S.P. Narayanan and G. Christopher, Reg. no. ACESSD/EW/47; 0-4-6, Megha Plantation area - Nedumkandam, Idukki district, Habitat: Considerably wet grass area with rocks in a depression, Date: 26 January 2011, Collectors: S.P. Narayanan and G. Christopher, Reg. No. ACESSD/EW/48; 0-0-1, Shishak Sadan, Ulloor, Thiruvananthapuram district, Habitat: Urban area, collected from a wet area near a bathroom, Date: 6 March 2012, Collector: T. Augustine, Reg. No. ACESSD/EW/66.

Distribution: Kerala (present record): Parackal estate near Rajappara, Megha Plantation area near Nedumkandam (Idukki district), Kochupamba (Pathanamthitta district), Shishak Sadan, Ulloor (Thiruvananthapuram district); elsewhere: Punjab, Puducherry, Tamil Nadu (Begum and Ismail, 2004; Dhiman and Battish, 2006; Julka, 2008); other countries: native - Cameroon, Gabon, Ghana, Guinea, Ivory Coast, Liberia, Nigeria, Sierra Leone, Togo (Gates, 1972; Oboh *et al.*, 2007); exotic - Bahamas, Bermuda, Brazil, Cape Verde, Colombia, Cuba, Fernando Po, French Guiana, Great Comoros, Guyana, Haiti, Madagascar, Martinique, New Caledonia, New Zealand, North America, Panama, Puerto Rico, Sao Tome, Sri Lanka, St. Croix, St. Helena, St. Pierre-Miquelon, St. Thomas, Surinam, Trinidad, Venezuela (Beddard, 1895; Gates, 1972).

The details gathered from the local people of the area revealed that these are escapees from the active or abandoned compost pits. They were found in considerable numbers in almost all sampled sites. As per T. Augustine at Ulloor considerable numbers of these were seen in the bathroom and premises especially in night.

E. eugeniae is widely used in our state for vermi-composting. It is likely that the *E. eugeniae* has already been established in various areas of the state through the compost. Gonzalez *et al.* (2006) stated that once an exotic species has become established in a new place, regional and species characteristics seem to be the key factors determining their spread. *E. eugeniae* being a very active, fast breeding species and due to the tropical climatic conditions of the state, which is almost same as that of its native place, it would proliferate here and may adversely affect the native earthworms especially the epigeic forms. It is likely that it would have its impact on the less understood soil ecology of our state. Hence vermi-composting with this exotic species has to be carried out with great caution.

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References

- Aiyer, K.S.P. 1929. An account of the oligochaeta of Travancore. *Records of the Indian Museum*, 31(1): 13-76.
- Beddard, F.E. 1895. *A monograph of the order Oligochaeta*. Oxford at the Clarendon Press.
- Begum, V.I.R. and Ismail, S.A. 2004. Illustration of earthworms occurring in and around Chennai, India.

Zoos' Print Journal, 19(3): 1394-1400.

Dhiman, N. and Battish, S.K. 2006. Earthworms from northern Indian state with *Ocnerodrilus occidentalis* Eisen, 1878 as new report from Punjab. *Zoos' Print Journal*, 21(1): 2135-2137.

Dominguez, J., Edwads, C.A. and Ashby, J. 2001. The biology and population dynamics of *Eudrilus eugeniae* (Kinberg) (Oligochaeta) in cattle waste management. *Pedobiologia*, 45: 341-353.

Gates, G.E. 1972. Burmese earthworms, an introduction to the systematic and biology of the megadrile oligochaeta with special reference to South East Asia. *Transactions of the American Philosophical Society* (n.s.), 62 (7): 1-326.

Gonzalez, G., Huang, C.Y., Zou, X. and Rodriguez, C. 2006. Earthworm invasions in the tropics. *Biological Invasions*, 8: 1247-1256. DOI 10.1007/s10530-066-9023-7

Julka, J.M. 2008. *Know your earthworms*. Foundation for Life Sceiences & Business Management, Sloan. 51 pp.

Oboh, B.O., Akintobi, D.O. and Ejidereonwu, C. 2007. Morphometirc studies in *Eudrilus eugeniae* populations form different locations in Lagos, Nigeria. *Nature and Science* 5(2): 16-21.

Stephenson, J. 1923. *The fauna of British India, including Ceylon and Burma – Oligochaeta*. Taylor and Francis, London. Xxiv + 518pp.



Figure 1. *Eudrilus eugeniae* (Kinberg) specimen collected from Megha Plantation, Idukki